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**The Impact of Lost Leave on the Medical Readiness of US Soldiers:
It's not a European Vacation**

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The views expressed are those of the authors and are not necessarily those of the U.S. Army or the Department of Defense.

The Impact of Lost Leave on the Medical Readiness of US Soldiers: It's not a European Vacation

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The impact of operations tempo (OPTEMPO) on soldier and unit readiness has been a primary concern of leaders and researchers in the U.S. Army (Castro & Adler, 1999). The extent to which repeated deployments, training exercises and garrison duties take a toll on readiness has been documented in a series of analyses conducted by the U.S. Army Medical Research Unit-Europe on data from a two-year study of U.S. soldiers stationed in Germany and Italy. Depending on the type of environment (deployed, garrison or training), the relationship between workload factors and outcomes varies. For example, the amount of days spent in training does not impact family strain, but it is associated with higher combat and operational readiness scores (Castro & Adler, 2000). Similarly, work hours are associated with increased family strain and decreased military readiness (Castro & Adler, 2000). Working on one's day off is associated with increased alcohol use for single junior-enlisted soldiers (Castro, Huffman, Bienvenu, & Adler, 1999). Based on these kinds of findings, there is clear and emerging evidence that high workload takes a toll on everything from medical to operational readiness.

One underlying assumption of the OPTEMPO readiness model is that if the pace of operations remains high, without time off for recovery, readiness and performance will decline. Soldiers in the U.S. Army work hard. Their 30 days of leave a year and their passes issued by commanders provide them a break from an otherwise relentless pace of military operations. In this paper, we examine the degree to which respite from their workload in the form of vacation time affects readiness indicators.

The civilian literature on stress and coping emphasizes the importance of leisure activities in maintaining health and adjusting to work. Nevertheless, few studies have directly examined the role of vacations. While there is some indication that vacation is linked to increased job and life satisfaction (Lounsbury & Hoopes, cited in Westman & Eden, 2000), Eden (cited in Westman and Eden, 2000) found that despite some improvements in psychological strain during vacation, scores on measures of strain rose to pre-vacation levels immediately after the vacation.

In a study of the impact of vacation on burnout, Westman and Eden (1997) studied 76 clerks in an Israeli electronics firm. They found that vacation was associated with a reduction in burnout scores during the vacation and three days after returning to work. This improvement faded over time, however, and returned to pre-vacation levels 3 weeks after the vacation ended. The authors conclude that vacations provide only temporary respite from work-related burnout.

In a study of 53 employees of an Austrian hardware manufacturer, Strauss-Blasche, Ekmekcioglu, and Marktl (2000) found that three days after vacation there were improvements in physical complaints, sleep and mood compared to pre-vacation levels but no changes in life satisfaction. Of those improvements, physical complaints remained at reduced levels 5 weeks

post-vacation. The authors confirm that vacations may result in short-term improvements in well-being.

Although the respite may be temporary, vacations have been linked to long term physical health. In a large-scale study of middle-aged American men at high risk for coronary heart disease, men who reported having had a vacation over a five-year period had lower mortality rates, especially those deaths attributable to coronary heart disease, nine years later (Gump & Matthews, 2000). This effect was found even when socio-economic status and health during the study were controlled. The authors did not, however, assess the amount of time the men spent on vacation but rather asked whether the men had a vacation or not. In addition, the personality differences that might account for both taking a vacation and being at risk for coronary illness were not assessed.

Thus, the research, while sparse, suggests that there may be long-term physical health benefits to vacations (or the kind of personality associated with taking a vacation) and evidence for short-term psychological relief from job stress. The degree to which this may apply to military personnel is not certain. The only research on leave time and military service that we were able to identify was a study of 81 Israeli reservists who found respite in terms of burnout and psychological stress from their civilian jobs one week after returning to work following a period of active military service (Etzion, Eden, & Lapidot, 1998). The role of leave, as vacations are called in the U.S. military, in providing respite to soldiers has not been examined empirically.

In the present study, we examined a stressor related to vacations that has specific relevance to the U.S. military: lost or cancelled leave and passes. In the U.S. military, a commander can cancel a soldier's leave and pass if the mission requires it. The reality of the high OPTEMPO in U.S. forces in Europe is that soldiers are not guaranteed that they can take the leave time they have earned – their leave time may be cancelled, accumulated as part of the following year's total or simply lost (if there is no opportunity to take it). Soldiers, regardless of rank and length of service, earn 30 days of leave a year. They can accrue up to 90 days of leave over a three-year period. Any amount over that is "lost" and cannot be recovered. There are exceptions to this policy, such as accruing leave while deployed. Thus, as part of examining the relationship between measures of OPTEMPO and readiness, we focused on the role of lost and cancelled leave time in accounting for individual differences in medical readiness.

METHODS

Research Sample

The data from this study were drawn from a large on-going longitudinal study assessing the impact of operations tempo (OPTEMPO) on U.S. Army soldiers and units stationed in Europe (Castro, Adler, and Bienvenu, 1998). The soldiers in this study completed the questionnaire from April to June 2000. The sample consisted of 623 soldiers assigned to one of ten units (company size) stationed in either Germany or Italy. Of these units, five were combat arms units and five were combat support or combat service support.

There were 546 male soldiers and 77 female soldiers (comprising 87.6% and 12.4% of the sample, respectively), ranging in age from 18 to 49 years ($M = 25.23$, $SD = 5.51$). There

were more junior-enlisted soldiers (62.9%) than non-commissioned officers (NCOs; 37.1%). Half of the soldiers were married (50.4%); 41.4% were single, and 8.0% were separated or divorced.

OPTEMPO Measures

We assessed soldiers' OPTEMPO through a series of questions about number of hours worked per day, number of days worked per week, number of days spent on training exercises in the past six months, number of deployments, and number of years of military service.

Lost Leave Time Measure

There was one question asked about lost leave time: "How many days of leave and/or passes have been lost or cancelled in the past 12 months?"

Moderating Variables

Recognition. We assessed Recognition using a 3-item scale (Brown & Leigh, 1996). The items, rated on a 5-point scale from strongly disagree to strongly agree included "I rarely feel my work is taken for granted," "My superiors generally appreciate the way I do my job," and "The organization recognizes the significance of the contributions I make." Reliability for the scale is high (Cronbach's Alpha=.70).

Task Significance. Task Significance (Bliese, Escolas, Christ, & Castro, 1999) was measured by 3-items on a 5-point scale from strongly disagree to strongly agree. The items were "I feel that what I am doing is important for accomplishing my unit's mission," "I am making a real contribution to accomplishing my unit's mission," and "What I do helps accomplish my unit's mission." Reliability was very high (Cronbach's Alpha=.94).

Leadership. Cohesion between soldiers and leaders, also known as vertical cohesion, was assessed using 12-items, six items each pertaining to officers and non-commissioned officers (NCOs; Marlowe et al., 1985; Vaitkus, 1994). This scale has been used in previous studies (e.g., Bliese, Escolas, Christ, & Castro, 1998). The two vertical cohesion scales consisted of the following 6-items: (a) "The officers/NCOs in my unit establish clear work objectives," (b) "The officers/NCOs in my unit are interested in my personal welfare," (c) "The officers/NCOs in my unit delegate work effectively," (d) "The officers/NCOs in my unit let soldiers know when they have done a good job," (e) "The officers/NCOs in my unit avoid micromanaging soldiers' work," and (f) "The officers/NCOs in my unit are interested in what I think and how I feel about things." The Cronbach's alpha for the officer and NCO leadership scales in the current sample was 0.90 and 0.92, respectively.

Leave Taken. There was one question on amount of leave time taken: "How many days of leave and/or passes have you taken in the past 12 months?"

Outcome Measures

Physical Symptoms. The 22-item Physical Symptoms scale assesses a variety of common physical complaints from headaches to stomach intestinal upset on a 4-point response scale from not at all to very often. Items were summed to create a weighted sum score. This scale has been used in several U.S. army studies (e.g., Bliese, Escolas, Christ, Castro, 1998; Castro, Bienvenu, Huffman, & Adler, 2000; Halverson, Bliese, Moore, & Castro, 1995).

Depression. Depression was measured by a 7-item scale adapted from Radloff's (1977) Center for Epidemiological Studies-Depression scale (CES-D Scale; see Ross & Mirowsky, 1984). The items describe symptoms of depression (e.g., felt lonely, trouble keeping your mind on what you were doing) and instructs respondents to rate how many days during the past week they have had each of the feelings or experiences on a scale from 0 to 7 days. The modified version of the scale correlates .92 with the full CES-D (Mirowsky, 1996). The scale has been used in other research with U.S. Army populations (e.g., Castro et al, 2000). Reliability for this scale in the present study was high (Cronbach's Alpha=.87).

RESULTS

Descriptive Statistics

Table 1 presents the means and standard deviations of the moderators and outcome measures. In terms of OPTEMPO, soldiers reported working 10.9 hours a day (SD=3.3) and 44.6% reported performing duty-related work more than 5 days in the past week. In terms of the number of training days in the past 6 months, 22.0% of soldiers reported no days on a training exercise, 22.2% reported 1 to 14 days, 17.9% reported 15 to 30 days of training exercises, 24.3% reported 31 to 60 days, and 12.6% reported more than 61 days. In terms of deployment history, 42.1% had been on a deployment lasting more than 30 days in their military career; the total sample averaged .2 deployments for every year of military service, or one deployment every five years.

In terms of lost or cancelled leave, 86.9% of soldiers reported no lost leave, 5.7% reported losing 1 to 7 days, 4.2% reported losing 8 to 14 days, and 3.2% reported losing more than 14 days. Lost leave did not correlate with leave taken ($r=.02$, n.s.) or with age ($r=-.07$, n.s.). There were no differences in amount of lost leave between junior-enlisted soldiers and NCOs, $t(617)=.97$, n.s.

Table 1. Means and Standard Deviations of Moderators and Outcome Measures

Variables	M	SD
Health Measures		
Physical Symptoms	31.5	9.1
Depression	10.9	12.1
Moderators		
Leave Taken	17.40	13.0
Task Significance	3.3	.9
Recognition	2.9	.8
NCO Leadership	3.1	.9
Officer Leadership	3.0	.9

N=623.

In order to assess the impact of Lost Leave on soldier physical and psychological health, we ran a series of regression equations. Each independent variable was first z-transformed. The regression equation included the predictor variable (i.e. lost leave), one of the moderator variables, and the interaction term. The dependent measures were Physical Symptoms and Depression Symptoms. Results are presented in Tables 2 through 6. In the case of predicting Physical Symptoms, the main effects for Lost Leave, the moderators, and their interactions were significant for all moderators except for leave taken. For the moderator Leave Taken, the interaction with Lost Leave was significant but the main effect for leave taken was not. For the regression equations predicting number of Depressive Symptoms, there were significant main effects for Lost Leave, Task Significance, Recognition, and NCO Leadership and Officer Leadership but no significant interaction effects. There was no main effect or moderating effect for Leave Taken in predicting Depression Symptoms.

Table 2. Regression Results from Lost Leave and Task Significance predicting Physical and Depression Symptoms

Variables	Outcome									
	Physical Symptoms					Depression Symptoms				
	Beta	SE	β	t	p<	Beta	SE	β	t	p<
Constant	31.46	.36		87.97	.001	10.70	.46		23.25	.001
Lost Leave	.80	.39	.09	2.04	.05	1.05	.51	.09	2.06	.05
Task Significance	-1.75	.36	-.19	-4.90	.001	-3.68	.46	-.31	-7.99	.001
Lost Leave X Task Significance	-.55	.29	-.08	-1.90	.06	-.37	.37	-.04	-1.00	n.s.

Note: Physical Symptoms Total $R^2 = .06$; $F(3, 614) = 13.74$, $p = .001$.

Depression Total $R^2 = .11$; $F(3, 615) = 26.12$, $p = .001$.

Table 3. Regression Results from Lost Leave and Recognition predicting Physical and Depression Symptoms

Variables	Outcome									
	Physical Symptoms					Depression Symptoms				
	Beta	SE	β	t	p<	Beta	SE	β	t	p<
Constant	31.44	.35		89.58	.001	10.77	.45		23.70	.001
Lost Leave	.75	.37	.08	2.03	.05	1.24	.48	.10	2.56	.02
Recognition	-2.36	.35	-.26	-6.70	.001	-4.12	.45	-.34	-9.07	.001
Lost Leave X Recognition	-.90	.32	-.11	-2.79	.01	-.11	.42	-.01	-.27	n.s.

Note: Physical Symptoms Total $R^2 = .10$; $F(3, 614) = 22.03$, $p = .001$.

Depression Total $R^2 = .13$; $F(3, 615) = 31.72$, $p = .001$.

Table 4. Regression Results from Lost Leave and NCO Leadership predicting Physical and Depression Symptoms

Variables	Outcome									
	Physical Symptoms					Depression Symptoms				
	Beta	SE	β	t	p<	Beta	SE	β	t	p<
Constant	31.46	.35		90.48	.001	10.72	.45		23.76	.001
Lost Leave	.90	.35	.10	2.55	.02	1.27	.46	.11	2.75	.007
NCO Leadership	-2.55	.35	-.28	-7.37	.001	-4.14	.44	-.35	-9.32	.001
Lost Leave X NCO Leadership	-.98	.30	-.13	-3.31	.01	-.55	.38	-.06	-1.44	n.s.

Note: Physical Symptoms Total $R^2 = .12$; $F(3, 614) = 26.86$, $p = .001$.

Depression Total $R^2 = .14$; $F(3, 615) = 34.36$, $p = .001$.

Table 5. Regression Results from Lost Leave and Officer Leadership predicting Physical and Depression Symptoms

Variables	Outcome									
	Physical Symptoms					Depression Symptoms				
	Beta	SE	β	t	p<	Beta	SE	β	t	p<
Constant	31.48	.35		89.30	.001	10.87	.46		23.45	.001
Lost Leave	1.00	.36	.11	2.81	.01	1.44	.47	.12	3.06	.003
Officer Leadership	-1.72	.35	-.19	-4.90	.001	-3.21	.46	-.27	-6.93	.001
Lost Leave X Officer Leadership	-1.37	.32	-.17	-4.34	.001	-.66	.42	-.06	-1.60	n.s.

Note: Physical Symptoms Total $R^2 = .08$; $F(3, 614) = 18.81$, $p = .001$.

Depression Total $R^2 = .09$; $F(3, 615) = 21.07$, $p = .001$.

Table 6. Regression Results from Lost Leave and Taken Leave predicting Physical and Depression Symptoms

Variables	Outcome									
	Physical Symptoms					Depression Symptoms				
	Beta	SE	β	t	p<	Beta	SE	β	t	p<
Constant	31.53	.36		87.03	.001	10.88	.48		22.60	.001
Lost Leave	1.55	.37	.17	4.15	.001	1.83	.50	.15	3.69	.001
Taken Leave	-.26	.37	-.03	-.72	n.s.	-.40	.49	-.03	-.82	n.s.
Lost Leave X Taken Leave	-1.01	.33	-.13	-3.08	.005	-.71	.44	-.07	-1.62	n.s.

Note: Physical Symptoms Total $R^2 = .04$; $F(3, 613) = 7.42$, $p = .001$.

Depression Total $R^2 = .02$; $F(3, 614) = 4.92$, $p = .002$.

DISCUSSION

The pace of operations for U.S. soldiers involves long workdays, several weeks of training, and the possibility of deployment. While there is evidence from research with civilian employees that respite is gained from vacations, in this study we failed to establish a direct link between Leave Taken and Physical or Depression Symptoms. The loss or cancellation of leave, however, was directly linked to Physical and Depression Symptom levels in U.S. soldiers. Moreover, higher rates of Lost Leave were predictive of greater physical symptomatology and this relationship was moderated by Officer and NCO Leadership, Task Significance, and Recognition.

Lost and/or cancelled leave is an area that has not been previously explored. The reason that lost and cancelled leave is associated with diminished medical readiness may be due to several factors. First, lost and cancelled leave may result from any combination of work stressors including uncertain training or deployment dates, other last-minute schedule changes, task overload, and short suspenses. Surprisingly, however, based on data not presented here, scores on a predictability scale were not correlated with lost leave. Second, lost and cancelled leave also suggests increased personal stressor in terms of family strain and financial costs incurred when vacation plans are changed. Third, lost and cancelled leave may be a stressor for soldiers because it creates a sense of relative deprivation, that soldiers are being deprived of some benefit to which they are normally entitled.

Regardless of the stressors involved when leave is lost or cancelled, there are things that leaders can and should do that can moderate the impact of lost leave on medical readiness. When soldiers feel their accomplishments are recognized, that their jobs make a significant contribution, and leadership at both the officer and NCO level is positively perceived, the impact of lost leave on medical readiness is reduced. These moderating effects suggest that there are behaviors leaders and organizations can engage in when faced with having soldiers lose leave.

Finally, unlike previous studies, we did not find evidence for a positive impact of leave on depression symptoms. This lack of positive impact on psychological wellbeing may be a result of the time frame used in the study. In our study, soldiers were asked about their leave time during the past 12 months but the health questions were not asked immediately following this leave period the way it was in previous research. There may be a respite effect from leave but if there is, like previous research has found, this respite appears to be short-lived at best. In terms of physical health, however, taking leave moderates the impact of lost leave on physical symptoms.

Our results suggest that for U.S. soldiers, taking leave is not as critical an issue as is losing leave. It is the loss and cancellation of the promise of leave that is predictive of increased physical and psychological symptomatology. For U.S. soldiers, loss and cancellation of leave may signal a lack of commitment by the Army to them that is only counteracted through strong leadership. When soldiers perceive that their sacrifice (i.e. loss or cancellation of leave) is worthwhile and appreciated, or when they have had respite, they do not have as many physical symptoms. The exact mechanism by which job-related variables moderate the impact of lost leave is not well understood. And why these same moderators do not affect depression symptoms is also not adequately understood. Taking the literature on vacation respite into account, it may be that leave issues affect soldier physical health in the long-run while psychological issues are affected in the short-run, if at all.

These results have implications for the military at two levels. First, it points to the importance of minimizing the amount of lost and cancelled leave time. Second, the results identify things that leaders can do to minimize the impact of lost leave on soldier medical readiness.

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